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5G: The Convergence of Telecom and Entertainment

Executive Summary

This quarter, we step away from our detailed analysis of mobile infrastructure, handsets, and IoT. Instead, we're taking a big-picture look at WHY mobile operators are deploying 5G, and what is really going on at a strategic level in the mobile telecom market.

In short, mobile operators are sending clear signals that they are committed to a future where the network is a commodity, and their profit comes from the media that are consumed over the network. Profits from the "simple pipe" are dropping, and leading operators are now moving toward acquisitions of entertainment and media companies. Early examples include Verizon's investment in NBA content and the acquisition of Yahoo, as well as AT&T's attempt to buy Time Warner. Rumors of cable/mobile mergers are multiplying as well, as both types of distribution networks will be serving similar video content.

The convergence of media companies, cable distribution, and mobile distribution indicates a future of mega-competition between huge combined companies. Streaming an HD movie over 5G might incur about $4 of movie rental charges, resulting in more than $2 of profit despite break-even performance in the mobile network.

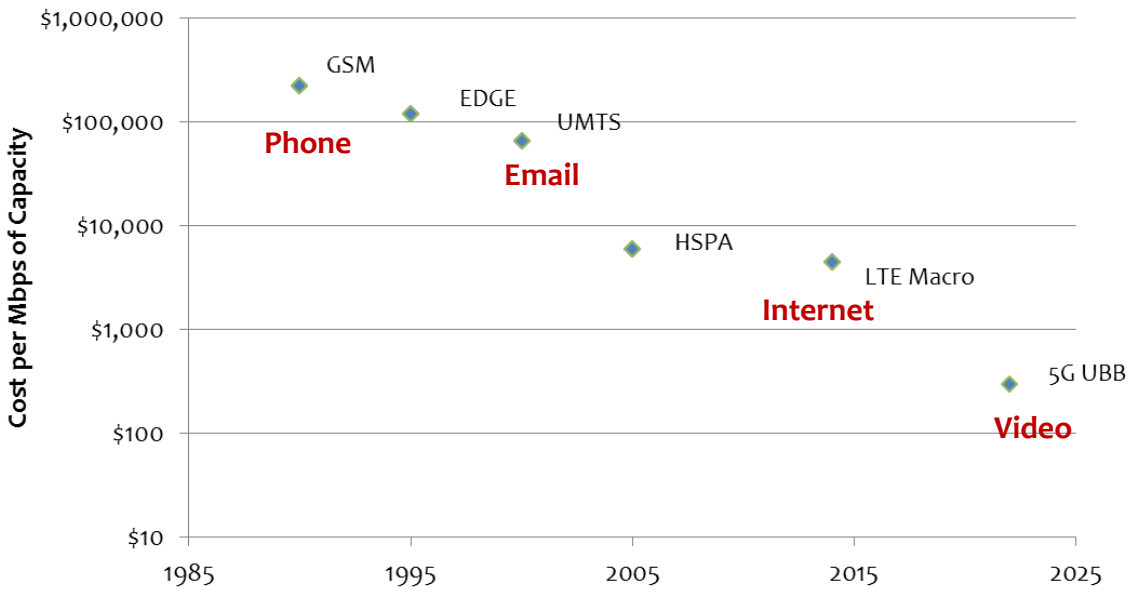

Figure 1. **The purpose of mobile telecom changes with its cost**

Source: Mobile Experts

The Big Picture in Telecom

People say that Steve Jobs was a genius, because he predicted the applications that people wanted to use. It's clear that he was gifted in this way, but his formula is not magic. Jobs simply looked at the applications that people *already liked to do* using conventional means, and created a better way. Examples of this phenomenon include some Apple success stories, and others as well:

- The Apple II and Mac replaced typewriters with word processing software on personal computers. Other applications arose after these machines became successful.
- The iPod replaced the Walkman, the boom box, and the transistor radio.
- The iPhone added a better display to the smartphone, and basically replaced the camera.
- The iTunes service replaced physical sales of recorded music with online sales.

In a similar way, each generation of mobile technology has disrupted a major market for wired communications.

- 2G phones replaced wired phones, converting a $500B market to wireless.
- 3G smartphones allowed mobile email, disrupting the new wired Internet market for email (e.g. AOL could no longer charge a fee for service)
- 4G smartphones enabled mobile social media and Internet browsing.

To continue this theme, we ask a basic question: What is the #1 application that people want, but cannot use on 4G?

The simple answer is video. Cisco's famous VNI report predicts mobile video growth (CAGR) of 54% per year through 2021, higher than any other category. Video already represents more than 60% of mobile data traffic, and by 2021 Cisco predicts that video will grow to 78% of the total. If we include the impact of Virtual Reality and Augmented Reality as a type of video, then the video entertainment category could reach 90% or more of wireless traffic.

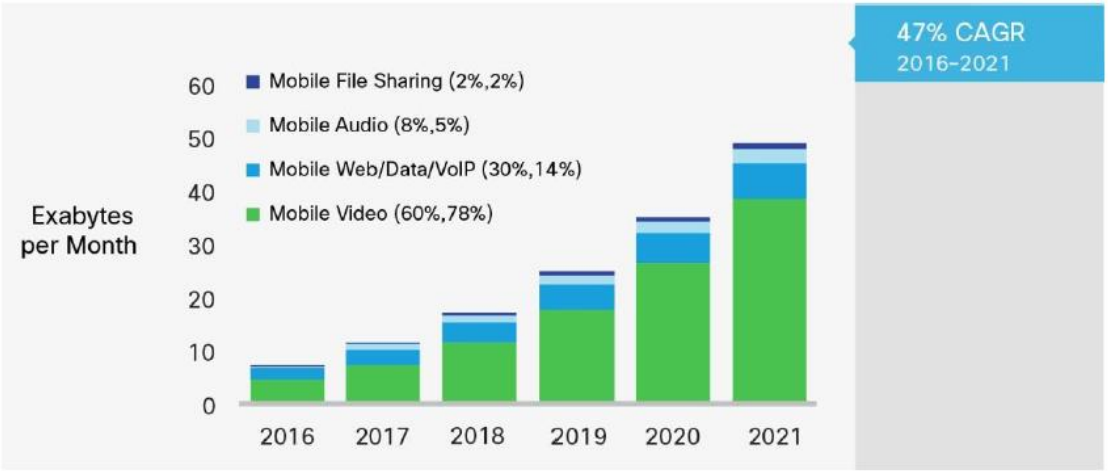

Figure 2. **Video dominates the mobile market**

Source: Cisco

One driver behind this: Social media sites and other OTT applications are programming their web pages to auto-start videos that are embedded on the page. This factor has contributed to a significant rise in LTE video traffic during the past year. (Note: it is possible to turn off this feature on Facebook, but most users do not understand what is happening well enough to make the change).

Despite this dominant story, clearly people hold back from using video on mobile devices wherever possible. While in 2016 about 8,000 PB per month of mobile video was consumed globally, the wired Internet handled 38,000 PB per month of video traffic. People still watch a lot more video on a fixed connection than on their mobile connection.

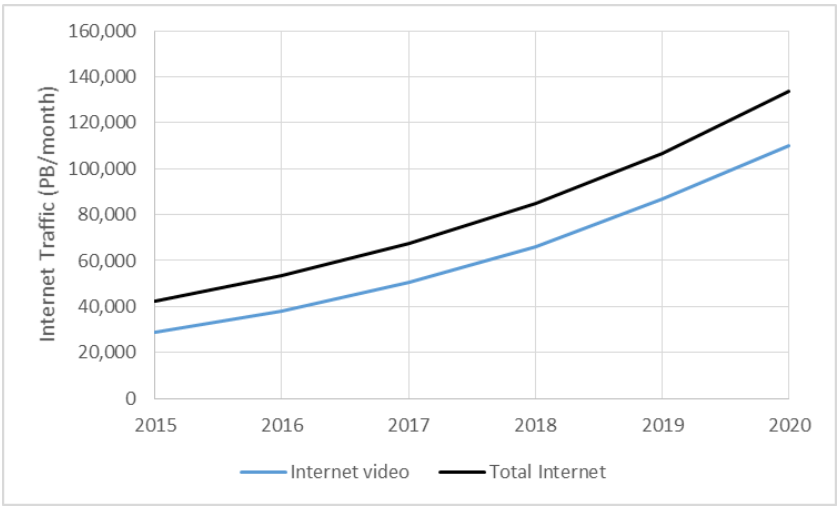

Figure 3. **Video also dominates the wired Internet—and most video is not on mobile**

Source: Cisco

American smartphone users are well trained to stream video content on Wi-Fi, not LTE. The reason is simple: LTE is expensive.

Wi-Fi is generally considered "free" while LTE has carried a heavy price per GB. During 2016, the typical American pricing plan provided 8-10 GB of data for about $40. That dynamic is now starting to change, as American operators are embracing the "unlimited" data plans all over again.

The point of this analysis is to illustrate that the wired Internet has taken control of video entertainment, and the mobile operators would like to compete for a piece of the $1.8 trillion dollar entertainment market.[1] The American operators have started offering unlimited data, not because they want to provide more data for the same price… but because they see an opportunity to make money on the media itself.

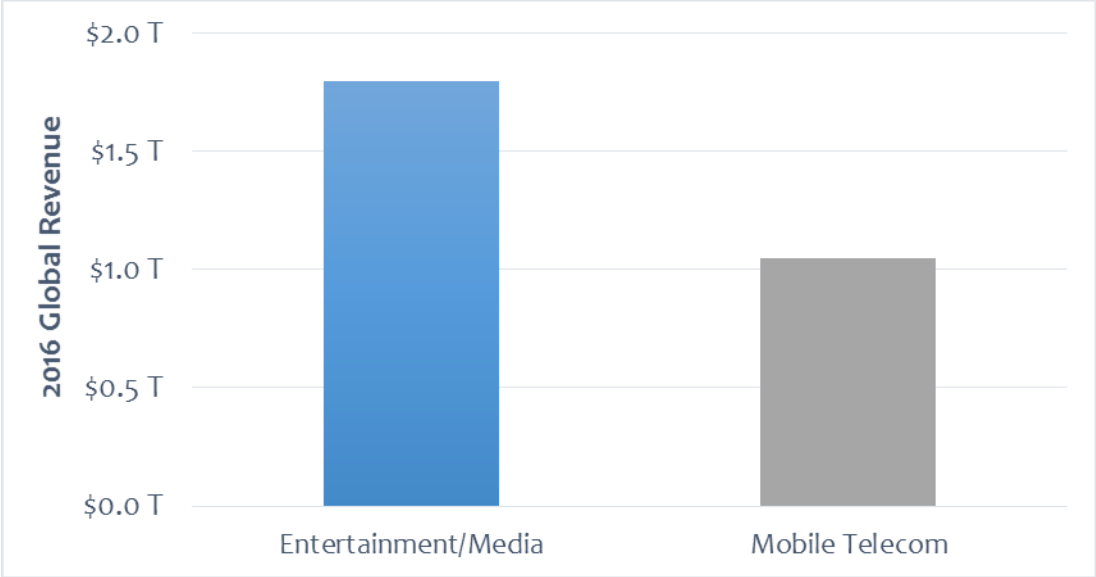

Figure 4. **The Entertainment+Media market is bigger than Mobile Telecom**

Source: GSMA, Statista, Deloitte

As an example, AT&T has $164B in revenue and $24B (14%) operating income. They've made an offer to acquire Time Warner Inc, with $29B in revenue and 25% operating income. Why? It's clear that AT&T sees a grim future for the wireless pipe by itself, and they would like to diversify into the content market where the profit margin is higher and more sustainable.

[1] $1.8T total market size per Statista, with close agreement by Deloitte and PWC.

How the Mobile Operators will Attack 5G

If we accept the conclusion of the previous section, that operators want to pursue the video content market, then we look at 5G investments differently. Instead of expecting new smartphone revenue to pay for the 5G infrastructure (a dubious business plan), the operators can start aggregating unique and interesting entertainment content to be delivered over their 5G network.

Today, the interesting and unique content includes movies, games, and online media. The future may include more interactive entertainment with Virtual Reality, where low latency broadband connections will be important to customer value.

As a result, we expect 5G investments to happen in two major waves. The biggest investments will be made in the 2019-2024 timeframe in the 3-4 GHz bands, with infrastructure that can be co-located with existing LTE networks for minimal capital expense. However, the spectrum available to each operator in the 3-4 GHz range will be limited to 100 MHz or even less. Therefore we expect the operators to run short on capacity quickly, and they will want to add a secondary 5G band in the 20-40 GHz range.

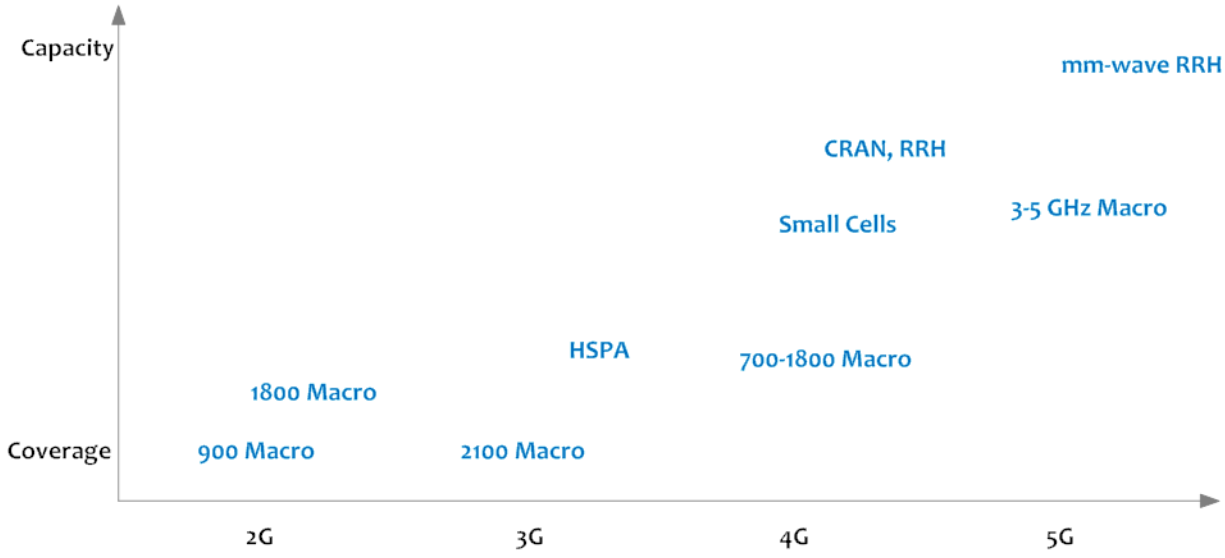

Figure 5. **Every generation starts with coverage and moves toward capacity**

Source: Mobile Experts

In the United States, this two-step investment process is inverted, as the 28 GHz and 39 GHz spectrum is available right away and the 3-4 GHz spectrum is not. Therefore the operators are pursuing fixed broadband connections where they are useful. Clearly they will jump at the

chance to license spectrum in the 'mid band' region between 3 GHz and 6 GHz whenever it becomes available.

How big will the 5G wave get?

Each wave of capital investment in mobile telecom has peaked higher than the previous wave, so many analysts predict that 5G will be a huge wave of capital investment. We disagree. In every previous generation of mobile telecom, the operators worked to deploy equipment within a short time period. LTE deployment in China, Japan, and the United States was strongest in the 2013-2015 timeframe. This was possible because the operators were chasing a monolithic business model that they understood: consumers with smartphones.

Today, everybody that can afford a smartphone has one. Simply offering a faster pipe will not increase the revenue for a mobile operator. The operator needs to change his business proposition, to sell something new. Proactive operators like AT&T are pushing ahead quickly, but other operators in Europe, Latin America, and South Asia will lag behind. We believe that the 5G wave will be spread over a 10-year period instead of peaking in a 2-3 year 'wave'.

Overall, the 5G Broadband could become a tectonic shift for telecom and for entertainment. If the network is becoming a "dumb pipe", then some operators will rise above the pipe and start offering the content. Teenagers are already changing the nature of the entertainment market, opening up this opportunity for a mobile telecom operator to take control.

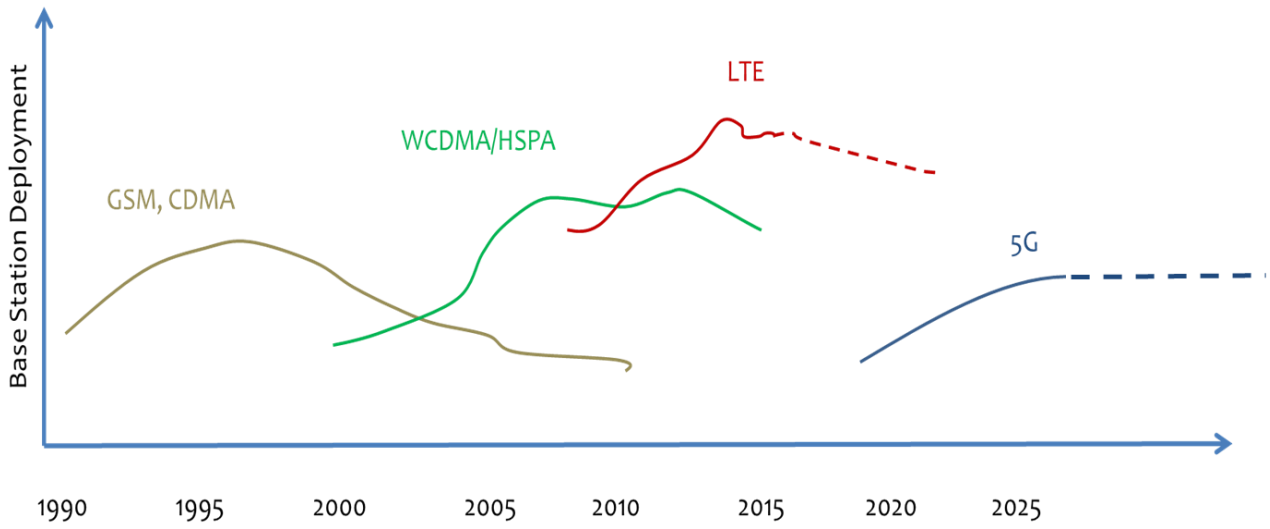

Figure 6. **Capital investment waves for each technology generation**

Source: Mobile Experts